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**Safeguarding for the Future:
Managing Born-Digital Collections in Museums**

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Submitted in partial fulfillment for the degree

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Abstract

Over the past few decades, advancements in technology have changed society entirely. Every bit of information about world news, popular culture, and art is just a tap of a touchscreen away. So many aspects of the contemporary world have become digitized so that it was only a matter of time before museums would have to face the issue of born-digital media in their collections. From videos to web-based art, museums have to tackle how to save this new form of cultural heritage. Museums have to do so now before it gets lost forever. The challenge of born-digital objects lies in its nature of impermanence and rapid obsolescence. Is it possible to safeguard collections for the future?

This thesis aims to explore and define born-digital collections in museums from the perspective of a registrar and collections manager. These kinds of objects and art are disreputably unstable and fragile. Throughout, I analyze how museums embrace digitization as well as various collections management practices, surrounding legal issues, and current preservation solutions. My thesis also studies the current challenges with preservation and conservation of digital media. I argue that the most optimized solutions for safeguarding born-digital media are yet to come in efforts to maintain access and preservation. Although the future is unpredictable, it is imperative for museums to research new methods for safeguarding born-digital collections for both public access and documentation of cultural heritage.

Table of Contents

Abstract.....	4
Table of Contents.....	5
Introduction.....	6
Chapter 1: From the 1960's to the Blue Man Group: Digitization in Museums.....	10
Chapter 2: Collection Conundrums, Best Practices, and Methodology.....	25
Chapter 3: Legal Issues Surrounding Born-Digital Collections.....	37
Chapter 4: The Future of Museums and Collection Management.....	48
Conclusion.....	56
Bibliography.....	57

Introduction

In 2012, parts of the East Coast were ravaged by Hurricane Sandy's angry path of destruction. Homes were swept away and entire towns were devastated. The New York Metropolitan area, which houses dozens of internationally-valued museums, libraries, and archives, was hit particularly hard. The South Street Seaport Museum's entire computer and electrical system was destroyed. After being closed for 10 months and a \$13 million-dollar renovation, the Seaport Museum reopened. Although its physical collections were safe due to their location on an upper level of the building, any digital collections could have potentially been lost as a result of museum computers being ruined. Museums can do their best to plan for the unexpected and the future, but born-digital collections often pose an even greater sense of fragility than tangible objects. Cultural heritage is no longer limited to physical objects because many aspects of society have become digitized—who we are as people is often dependent on technology. It is how people create things and do basic, everyday tasks. This thesis explores why it is imperative for museums to research and tackle new best practices for born-digital collections management in order to safeguard digital media for the future.

Born-digital objects like photography, videos and web-art are equally as important objects as 16th-century paintings hanging in museum galleries because they also tell the stories of what people thought and valued at a particular moment in history. Yet, born-digital objects are notoriously unstable and fragile due to the danger of technological obsolescence of hardware and constantly changing software environments in which they are presented and saved. In order to understand their intrinsic values, challenges, and opportunities, I explore the study of born-digital media in four chapters.

The first chapter titled “From the 1960’s to the Blue Man Group: Digitization in Museums” starts readers off in the earliest years of computers, taking them through examples of popular digital media today. Museums have had a reputation of being “behind the times” and slow to catch up with technology. There are many reasons for this, particularly because of being understaffed and underfunded. Computers came into museums in the 1960’s, not particularly for collections management but for more administrative tasks. This chapter studies the 1960’s computer revolution following the creation of televisions. It will also discuss the earliest collections management programs.

Because the first chapter focuses primarily on the history of technology in museums, I focus on some of the most common and earliest types of born-digital media. Photography, which ultimately led to film and video, has a long and well-rounded history before leading up to the digital photography used today. I then shift focus to newer, uncharted and up-and-coming genres like digital art and performance. I discuss current methods of preservation and its future through four specific types of digital media.

The second chapter, “Collection Conundrums, Best Practices, and Methodology” examines original and current collections management routes. From the earliest days of card catalogues to the databases we use today, this study demonstrates why museums face so many challenges when it comes to preserving born-digital objects. Because technology changes so frequently, often within a matter of months, museum professionals constantly need to update and migrate digital objects before the software and hardware they are saved on becomes irretrievable. Technology becomes obsolete at an alarmingly rapid rate, so when a museum has just one or two registrars on staff with loads of backlogs and other work like exhibitions, collections management tasks tend to fall by the wayside. Born-digital objects need more frequent attention.

For instance, the USB drive on which a photography collection is saved on may become obsolete eventually. Similarly, collections management databases require frequent updates.

Subsequently, Chapter 2 discusses new solutions for databases and ways to save digital media for museums. Other important collections management tools allow for numbering objects, for processing digital object loans for exhibitions, and for other basic tasks that registrars perform with collections. The level of care that a registrar or a collection manager exercises for tangible heritage does not differ from digital objects. However, the way in which the latter are cared for will change. From the time they are acquired by a museum, registrars must find and exercise new best practices to help keep them safe so they can be accessed and studied in the future or featured in the context of exhibitions and museum education.

Chapter 3, “Legal Issues: Copyright, Access and Ownership of Born-Digital Collections,” explores challenges surrounding the safeguarding of born-digital media by uncovering loopholes and questions in current professional practice and legislation. The internet has enabled people to upload, download, change, and transmit digital media instantly. The internet makes it difficult to control media content once uploaded. This chapter studies issues such as copyright, access, fair use, and ownership in relation to born-digital media.

When it comes to museums and digitization, copyright has always been an unclear problem in which registrars must tread lightly. Museums often have parts, if not entire collections, available for the public on their websites. This goes hand-in-hand with the public’s right to access, which will be explained at length in Chapter 3. Copyright is specific to each object in a museum, regardless of whether it is digital or not. Copyright is something given to the creator of an object or idea at the time of its conception. It eventually expires after a certain

period of time. This practice becomes confusing for museums especially when digitalizing something online or making it available for the public . Often, museums cannot control content once it appears online. This chapter discusses access, fair use and ownership. I argue that although the legislation and means to control born-digital media online may not yet exist, it does not mean that it will not be introduced in the future. In order to safeguard collections while maintaining the public's right to access to them, museum professionals must advocate why digital media are so important and why new ways must be found to keep it safe while granting access for years to come.

In the final chapter, "The Future of Museums and Collection Management," I discuss the concept of digital culture. Because of how reliant society is on technology ranging from smart phones for communication, GPS navigation for travel, and keyboards for typing, cultural heritage has been redefined. Despite all of the challenges for museums discussed in previous chapters, I argue that there are many positive attributes to today's digital world and that the best practices for safeguarding these objects will have yet to be defined.

Throughout this thesis, I discuss solutions for born-digital preservation like migration from one piece of hardware/software to another. A new solution called emulation is still in the research-and-trial stage. This method essentially mimics the obsolete technology in which digital content is saved in order to retrieve it. Emulation will be a major topic of up-and-coming solutions for museums. As always with technology, something better and greater may be around the corner. The same can be said for museum technology. Despite the fear and uncertainty surrounding the safety of digital objects, strategies to preserve and conserve them are actively being studied. Sooner rather than later museums will have new standards and practices to care for born-digital collections.

Chapter 1

From the 1960's to the Blue Man Group: Digitization in Museums

Museums serve many purposes. They are pillars of preservation, research, science, education, exhibition, art, cultural heritage, and knowledge. Externally museums may be all of these things, but internally they face many different problems to which the public is not exposed to. Behind every photograph on display and behind every video playing on a monitor, a museum has a different story about what it took to make those objects viewable for the public. By wearing many different hats, collecting institutions open their doors to a plethora of permanent issues that coincide with maintaining digital collections. They go beyond basic collecting, preserving, and display and learn to become problem solvers, striving towards finding a most ideal solution to permanently care for these types of collections. Born-digital objects or not, museums have a duty to the public to sustain cultural heritage forever. This chapter takes a look at how professionals in the field challenged the digitization of museums and their collections over time, analyzing the issues surrounding four specific areas: photography, videography, digital art, and performance art. By taking a closer look at what digitization in museums means in relation to these four genres of collections, one better understands issues surrounding the born-digital world. This chapter illustrates why beginning to preserve and safeguard them today is imperative for ensuring continuous access to cultural heritage.

In order to understand how museums relate to born-digital collections, one must dig deep into the history of technology as a whole. Society has evolved into a digital one regarding the phones we use, the cars we drive, modern medicine and all things related to science. All of these things evolve around the use of technology. Relying on digital tools with their speed allows

people today to perform daily tasks with efficiency. Museums have a reputation of being slow to adapt to technological change when compared to how other professional fields and institutions embraced digitization. Several factors have contributed to this situation, ranging from lack of trained staff to scarcity of resources. For this reason, I first examine the subject in historical perspective and chart the path of museums towards digitization.

From the point of the conceptualization and founding of a museum, its primary focus during the early years is to concentrate on acquiring and collecting objects. Decades before museums attained today's levels of professionalization, they focused on building up a collection rather than on dealing with the more mundane tasks of proper documentation and record keeping. Even to this day, museums face issues with access to documents and accuracy of their records because their record keeping was paper based. Shortcomings with record keeping systems was arguably the first main push for museums to take a leap into digital technology (Williams 16).

The 1960's were a time of change in museums, according to David Williams, author of the book *Museums in a Digital Age*. This decade saw a rapid and dramatic shift in culture and society. New ideas and information prompted an "awakening" for the technological world as Williams explains. Museums began moving towards professionalization. They felt a pressure to become more accessible to all demographics. They also had a new audience—the television generation (Williams 16). Museums faced a new task of being able to find objects and records faster, they had more accountability for their collections, and most of all they felt more pressure to catch up to the rest of the newly digitized world. Computerization of museums meant a better functioning and signaled more ethically responsible institutions.

The first attempts for computerization occurred in the 1960'. Efforts were not quite successful, as the focus was on collections management and the technology was not ready yet (Williams 16). The first computers in museums were used for more administrative tasks like finance and some basic exhibitions-related functions. Computers were large, costly and had to be kept in cool rooms. Few staff members were adequately trained on how to use them (Williams 17).

In terms of collections management programs, there were several notable ones in the early days of computers. SELGEM, or SELfGEnErating Master, was created and used by the Smithsonian Institution. Towards the 1970's, this program moved to the non-profit business sector as a free program. For museum use, Williams explains, "composed of thirty-three unique programs, the package was issued as a 'generalized system for information storage, management, and retrieval especially suited for collections management in museums'" (17). Other programs similar to SELGEM were COBOL and GRIPHOS. COBOL was used for business applications while the latter was for more general retrieval and information processing for "humanities-oriented studies (Williams 17). Over time, these computers evolved just as the technology we use today has. Even still, there is no one universalized, ideal solution for all collecting institutions. This makes the lifespan and future of born-digital objects a daunting concept. The author goes on to say:

Unfortunately the information problems that plague the first two generations of computer projects continues to plague today's generation as well. Although the need to computerize is still present, no central source yet exists to coordinate between museum projects or disseminate information (Williams 20).

As a consequence, museums have been habitually hesitant to digitalize collections and upgrade both their software and methods of management as necessary. They fear technological obsolescence, making it seem not a worthwhile effort for staff, time, and finances. The need to safeguard digital materials from the moment they enter the museum. Such efforts are pivotal and trumps this fear of obsolescence. The same can be said for future collecting and preservation endeavors.

Moving forward, much of the digital world known today can be credited to photography. The concept of capturing an image has transcended time and technology, from the very first digital devices, televisions, to the smart phones desperately relied on today. The earliest forms of photography and cameras were invented in the early 1800's and used chemicals like silver nitrate to produce images. From daguerreotypes to George Eastman of Kodak, photography is one of the most obvious and rapidly accelerating forms of technology next to computers and telephones.

From a museum's standpoint, photograph collections management can be quite tricky in more ways than one. How photographs evolved in museum collections to the born-digital ones we see most often today is best understood by getting acquainted with the different types and what exactly "digital" means. There are five most common types of object photography. Color transparency is a positive color image on a clear film base. Color negatives are a negative color image on a clear film base. These are better known simply as "negatives." Black-and-white negatives are a negative, colorless photographic image on a clear base. Prints can be both black and white or positive color images printed on paper. Prints can come from both photograph negatives or digitally from a printer (Buck, Gilmore 277). Finally, digital images are an electronic photograph taken with a digital camera or scanned from another document. They are composed of "pixels, the smallest units displayed by computer monitors. Each pixel is assigned a

tonal value and is stored in binary code (zeros and ones) (Buck, Gilmore 277). There is a true science behind these digital images seen so commonly in everyday society. They have become a part of nearly everything people do in some form or another.

Another type of photography commonly found in museum collections is called analog. This is the most common type next to digital photographs. Authors of *Museum Registration Methods 5th Edition* explain that the origins of film trace back to this specific type of photography, something to keep in mind during later discussions of film and videography. This film-based photography was created when a gelatin emulsion was suspended in silver salts, which was then applied to film rolls. This can produce positive or negative images (Buck, Gilmore 278). One can say analog was a prelude to digital, as this type of film in the early days of photography allowed rapid production and made it more accessible to the masses (Buck, Gilmore 278).

Consequently, “digital photography, as known today, began with the recording of television images onto magnetic tape” (Buck, Gilmore 279). In 1951, the first video tape recorder (VTR) has the capacity to capture live images, converting them to electrical impulses, thus saving them to magnetic tape which could then be transmitted across the world. In the 1960’s, these digital technologies rapidly developed into computers and more advanced formats.

There are two color modules used in digital imaging: RGB and CMYK. The first consists of red, blue and green which is based on the trichromatic vision theory of the 19th century. Added together, they produce a wide array of colors for the display of images electronically and in analog format. CMYK includes the colors cyan, magenta, yellow, and key which stands for black. The black is often used separately from the three CMY colors for cost effectiveness, but

together they also produce a wide array of colors through a “half toning” process (Buck, Gilmore 279-280).

In terms of storage, digital images can be stored in many different ways. All have different benefits, negative traits, methods of saving and use, and some have aspects of loss. TIFF is a very moldable format with no risk of loss. This is the ideal storage method, as storage capacity and file size can be very large. Because of this, it is not good for internet files since it could possibly get lost. TIFF is best for archival collections that need lots of space.

Next, JPG is a file format that entails some loss. They are best for internet-based objects and files. Each time a JPG is saved, it degrades ever so slightly and over time. It essentially analyzes the image based on what the human eye will recognize the most, discarding what it will see the least.

PNG files come with no loss, they are an in-between size in regards to storage between TIFF and JPG. PNG is suitable for both internet files and archival collections.

Finally, RAW is an output for digital images. Comparable to TIFF but with some loss, RAW depends on the manufacturer’s software and may be irretrievable depending on its location or the file saved. Therefore, it is not preferable for internet or any archival collections (Buck, Gilmore 280-281).

Common storage methods, which will be discussed in a later chapter, include formats like floppy disks, CD-ROM, DVD, internal hard drives, external hard drives, and internet servers. A major issue with methods of storage like these is that eventually they will become obsolete and their mechanism of use will inevitably not work. For example, the floppy disk is no longer used. Modern computers are not built with a port for them and they have ultimately become replaced

by external hard drives like USB. In order to save objects and archival materials, museum staff must continuously keep track of and convert these storage devices. One can argue the main issues surrounding digital photography are the possibility of deleting images permanently, storage and methodology, as well as image resolution.

Overall, photographs are a gateway to cultural heritage. This heritage can be seen as the objects and materials that define who we are as a larger whole. The protection, identification, and recovery of photographs are of equal, if not most importance to any other museum object, a notion argued by one author. In her article about the importance of photographic proof of cultural heritage, Eleanor Mattern explains that photographs serve not just an aesthetic value, but proof of all culture and society in the past few centuries (1). A photograph is most certainly a document/object and therefore should not be cheapened in value or any less important when it is in a digital format. In the archival and museum world, photographs are seen in a “textual and paper-based” light. One must shift to a more contemporary view in terms of digital photography, as they are a part of cultural endurance and memory (Mattern 1).

Moving from photography to video, one can look deeper into how and why these born-digital applications of technology can affect museum collections. Film, which grew into videography, became a natural progression and counterpart to photography. Just like photography, videos have a long history of being a bit troublesome in museums. Starting with the basics of film and how it evolved over time, there were several types of film used. The most common older film used was cellulose nitrate film. This photo chemical was used for moving images and is chemically unstable. Another source of headaches for collection managers is cellulose triacetate film, known to cause “vinegar syndrome” and chemically decompose over time. These two were used most commonly in the 1900’s until acetate film was replaced by

polyester film in the 1990's. Acetate-based film is still used today for original negatives (Usai 250-251).

Subsequently, the digital technology boom has had a major impact on both film and video in museums in terms of collection care. One author who writes about the conservation of moving images, which meshes film and video, explains that there is a common illusion that digital is easier to care for than film. Many people feel there is little wear and tear on digital video and no necessity to worry about its material condition. According to Usai, this is wrong, stating the “concept of object decay becomes something different...digital files can easily be corrupted” (251). She goes on to say that “film is an art of reproduction,” a very true and blatant statement, hitting home to museums. Film is meant to be seen by the masses, and therefore transmitted, copied, downloaded, and a plethora of other activities. The same goes for born-digital videos like movies, television shows, and videos online—they are essentially one and the same. One simply cannot rely on a video's original form as a digital medium or source.

Today, video and moving image are used in a myriad of contemporary exhibitions as a form of art and in history and science exhibits as an educational tool. Some are interactive, while some play on a monitor for all to see. The display and maintenance of videos in museum collections, as well as their mechanisms of use, are difficult to upkeep. Just like physical objects, hardware used for display and storage gets old and may not work as it used to. From an exhibition standpoint, the audience does not care how a video looks as long as it works. Museum goers do not always realize the efforts it takes to provide those videos in displays or keep them in collections. This debacle will be discussed later on at length.

Thinking about collections management and conservation, there are several approaches museums can take towards digital videos. Usai explains, “Digitization has become a catchword encompassing three very different processes, goals, and objectives” (252). The first is digital restoration. This is essentially a set of technical and curatorial procedures that attempts to make a moving image look like what it did originally at the time of its release. The second is digitization, which is converting a photographic material to a digital format, usually for public access. An example of this would be taking a VHS tape and converting it to a DVD. Finally, digital preservation entails “a technological infrastructure capable of making the ‘digitized’ and ‘digitally retired’ moving image permanently available for viewing” (Usai 252). Usai also notes that there is no such thing (yet) of this “infrastructure,” as it is still uncharted territory. Making things universally permanent is no simple task when it comes to born-digital collection objects, which is why museums must get to the root of the issue—how to safeguard digital media despite this nature of impermanence.

Overall, there are two main obstacles with photographs and videos in museums. They include the need to periodically migrate digital files and the rapid obsolescence of the equipment used to store and operate them (Usai 253). This can be said for all of the digital media we discuss. When considering long-term solutions for preserving cultural heritage, Usai explains that society’s inherent flaw is that everything must be digital or digitized (253). In sum, we understand that the “inherently ephemeral nature of digital formats, vulnerability to data corruption, and impossibility of exercising full intellectual control over them” is the greatest downfall of this genre of collections (Usai 253). Museums are traditionally understaffed and underfunded for tedious tasks like technology updates and digital conservation. Relying mostly

on gracious donations and grants, many museums with digital collections have trouble sustaining the long-term needs of these objects.

Shifting gears, digital art is a genre of art that uses digital technologies as an intrinsic part of its creation or exhibition process. It can include artworks like web-based art, sound, computer-generated imagery, digital installations, and other possibilities. Digital art is arguably one of the most dynamic, undefinable art forms in existence, as so much of it has not yet been created. It is not tangible like painting and sculpture. It does not have the long history that photography has, as it is still so contemporary. Digital art can be practically anything. Unlike photographs and video, digital art poses its own set of challenges for museums faced with the challenge of preserving and exhibiting them.

Ars Electronica is an archive and museum located in Austria focused on all things digital media and art. Starting in 1979, this institution amassed one of the world's largest archives of all things relating to digital media art spanning 35 years (Ars Electronica 1). It even outpaced contemporary art museums like MoMA and the Whitney Museum in terms of digital art collections (Marchese 302). When asked about the number one long-term challenge faced in terms of preservation and conservation, Ars Electronica replied "longevity." Their approach is understood at an institutional level from the organization's goals and priorities to available recourses and policies (Marchese 302).

One author looks at digital art and exhibitions through a lens of the future, prompting readers to think about what an exhibition about 21st-century digital art would look like five hundred years from now. How accessible would the art be by then? Will it be at all? In his article *Conserving Digital Art for Deep Time* author Francis Marchese explains, "the goal of the digital

preservation community had been to create standards and develop best practices for the conversion of digital material into “archival formats” that could be manipulated and shared” (302). He goes on to say that digital artifacts in the future like computer programs and videos must be archived to durable media. Any digital storage device like a CD-ROM or DVD will ultimately either decay or become obsolete. Because of this, they must be “routinely refreshed to a new storage medium” (Marchese 302). This continuous transfer and save to archival format is the best solution this particular author sees. Operating systems, storage devices, and computer languages (e.g. HTML, flash, JavaScript) must evolve and change or else they will disappear.

Going back to the notion of a future exhibition of 21st century digital art, Marchese makes a startling quote, “It would be difficult to predict that a computer-based artwork created in 2010 would survive intact so it could be exhibited, as originally constructed in the year 2060” (303). Because of the nature of digital art forms, change is an inevitable part of a work’s life. Its original form and identity will have to be altered in order to survive. One must embrace this because this genre is not a traditional kind of art by any means and one cannot continue to treat it as such. It cannot be seen in a museum collection in the same capacity that an oil painting or antique chair because it is not tangible. Initiatives are fundamentally different for digital art since it can be already lost or deleted before preservation even begins. One cannot save something that no longer exists or is not viewable if the software and hardware is obsolete or unavailable (McGarrigle 171).

In terms of preventative care, the best chance at longevity (not necessarily survival) begins with the artist him or herself. Through the use of computer software that is standard in style, data structure, and code, artists can create their work in ways that will be easier for it to adapt and change over time. One digital artist, Conor McGarrigle, tackles preservation by

explaining how he saved his own work. *Spook...* (1999) existed as a web-based artwork which was originally about war, but eventually transcended into becoming about 1990's web culture. As we have discussed, web-based art or "networked art" requires a third-party platform (the internet), external links and different servers (McGarrigle 171). Essentially, it is uncontrollable once uploaded onto the internet. It can be uploaded, downloaded, and changed internationally without one's knowledge or control. How the artist continues to preserve the work today ties into this continuing discussion about the need for adaptation and change.

In his article *Preserving Born-digital Art: Lessons From Artists' Practice*, the artist of *Spook...* explains that early digital art was emergent and defining a new genre using new technologies. His experience has been a challenge, saying, "preservation of historical networked art raises complex issues that extend beyond problems of technical preservation to include the context of the work's production and original presentation" (McGarrigle 171). *Spook...* was only preserved because of the actions of the artist. The piece, though not located in a museum setting, poses uncertainty for the future of digital art not in museum collections or under the control of its artist. The life and longevity of those works could possibly be gone forever and much sooner than those in collections.

Looking at McGarrigle's web-based work, the website itself was created using standard HTML code, navigation windows, flash animation, and message boards. The content overall includes seven different pages with five other information pages, as well as links for user help (171). His preservation strategy and topics considered during his plan of action included four parts. The first was the idea of transitioning to today's HD screens versus how the work was supposed to look originally in 1999. The visuals the audience sees are part of the art and are not to be changed to a higher resolution or more contemporary images. The artist intended to keep

everything as it was visually in 1999. The second was the preservation of the linked websites, which are subject to rot over time. These links are hard to get back once lost, often impossible. Next, the work's structure was considered. The artist realized he would have to upgrade the code used of the website to meet the new, ever-changing standards. Last, he wondered if it was worth preserving or should be preserved at all. Perhaps it was the nature of the piece (McGarrigle 171-175). In the end, *Spook...* is still available today because of all the time and effort McGarrigle put in to maintain it.

Today, the artist's process is still the same. He essentially “redownloads archives and tracks all external links” associated with the work. He does this before the links rot and become totally inaccessible (McGarrigle 175). The artist replaces them with archived copies of the site links and this has seemed to work over the last fifteen years and a good solution for web-based art. Perhaps Conor McGarrigle's preservation hobby will benefit museums and collectors with digital art. Overall, many will say this method is incredibly time consuming and there must be a simpler solution. Despite all of his research, there is no real way to tell how many links associated with the work are on the internet in other formats. The internet generates opportunities as well as uncertainties—once something is uploaded it is instantly available for billions of people to click, send, change, and delete.

Some born-digital media is related to performance art. Museum-goers may think of performance through music concerts and dance. New digital artists are breaking down these traditional barriers proving anything is possible. One author, who meshes the idea of performance art with sound, explains that many new digital artists “establish inherent, organic, and fluid connections between the unfolding of musical and visual form” (Paul 134). Some involve audio-visual installations and performance, blurring the lines between what is video and

audio-based and what was created on the web, all while illustrating the plethora of possibilities with born-digital media. For example, Golan Levin is a digital artist who has mastered audio-visual composition. His abstract visual forms projected on a screen in a theater typically pair with a concert-like experience performed live. One of his pieces is a performance called *Tele Symphony* in which sounds generated a choreographed ringing on audience member's cell phones (Paul 134-135). There are also audio-visual components like screens with digital images and live music. "Many digital art works, from installations to internet art involve sound components without being specifically focused on musical aspects," author Christopher Paul explains when talking about these types of performance that involve audio-visual effects (133).

Referring to popular culture, one can take a look at the Blue Man Group as an example of performance art. They are "the Blue Man Group" in a most literal sense, being a trio of men painted in the color blue. Performed live onstage, the group incorporates aspects of digital media with computer-generated images on screen, sound bites and prerecorded music, animations, and so on. Like Golan Levin, the Blue Man Group uses the audience to interact through coordinated cell phone LED lights, texts, and various projections (Amaris 563). Overall, the audio-visual stimulation the audience is exposed to is all part of the effects produced by digital tools.

Thinking about museums and digital performance art, many things come to mind such as how to preserve it. One cannot preserve a moment in time unless recorded on video or audio. The software and digital aspects of the performance like the screens, sound bites, and auditory parts of the performance are not savable unless saved just like other born-digital works. Performance art turns into a whole other challenge for museums registrars and collection managers, as they save bits and pieces of one whole performance. This type of art encompasses nearly every type of born-digital art form discussed thus far, sometimes just parts like video and

sometimes the various components of the web-based art shown across screens. This is perhaps the most difficult of all digital media because performance art is unique and special in the moment and not always meant to be replicated.

The history of computer technology and the digitization of museums paved a long, challenging road for born-digital art in museums. Museums cannot remain pillars of the past, accumulating things on a shelf. The way in which they preserve must change just as technology changes. Change is the only way museums can evolve and fulfill their civic duty to the public of maintaining their cultural heritage. Through the examination of born-digital photography, video, digital art, and performance, one can understand the history of these media and the various approaches that museum registrars currently take to preserve them and make them usable for the public. Born-digital media and art is ever-evolving. This constant evolution prompts museum professionals to find better solutions for preservation and conservation. It is not a “hopefully we will” scenario, but a dire need for one.

Chapter 2

Collection Conundrums, Best Practices, and Methodology

Collections management and registration in museums are often intertwined. The museum world, which essentially began as a hobby of the wealthy and royal, grew into a sophisticated, professionalized field over the past few centuries. As time went by and museum professionals began taking collections management more seriously, the focus leaned towards best practices and procedures for object care. From environmental controls such as sunlight and temperature to pest mitigation and disaster plans, collections management became something of a science. In today's museums, new issues arise with digital collections. How does a registrar number and track an object that is not physically tangible? How do we preserve something whose mechanism of use will become obsolete in a matter of years with constant technology updates? How do we access the object then? These are all important questions collections managers face as digital photography and video, performances, and digital art become more popular. Because collections management for digital objects is so vastly different from a more traditional museum collection, a different approach must be taken towards maintaining them. The notion of object decay becomes more real and rapid. This chapter explores how digital collections are stored and preserved, how they are loaned for exhibitions. I will also discuss how registrars can best track these unique objects. By dissecting past and current methodology, I stress the need for museums to consider born-digital objects and their preservation needs at the moment they are acquired. This will aid in the safeguarding of digital media for future use and access.

Over the past several decades, museum registrars and staff have had several different methods of maintaining collections. Before the advent of computers, most museums utilized card

catalogues. In the simplest terms, these records will have object and donor information, accession numbers, and whatever other information the museum decides to include. This system is followed numerically based on the order of accession numbers. A kept order is essential to the registrar in terms of accountability (Buck, Gilmore 150-151). This system paved the way for digital databases, a method of record keeping that streamlined how museums track and catalogue their collections today. It can be seen as a stepping stone to the more sophisticated systems of archival record keeping that digital objects rely on.

As technology improves, collections management systems follow. Museums now use databases specifically designed for their collections. Even so, many museums are seen as being in technological dark ages with outdated computer and database systems. Often times this is due to the high cost of databases as well as the licenses to use them. For example, a simple database system like Past Perfect costs \$840 to purchase and a single license can cost up to \$345 for just the first year alone (Museum Software 1). Past Perfect is commonly used by smaller museums like historic houses for its comparable lower cost and simplicity. Museums like the New York Botanical Garden, which has over 7 million herbarium specimens in their collection, uses a program called KEmu. This database is meant for museums and institutions with massive collections. This runs over \$17,000 for just 5 users (CariLibrary 1).

Some of the other reasons why museum technology can be seen as outdated is based on the size of a collection and the difficulties that come with integrating it. During my time working as a collection assistant at the New York Botanical Garden, Administrative Curator and Botanist explained that although their version of the KEmu database seemed outdated, it was relatively new to the institution, as it took over five years and several different computer programs to transfer the entire 7 million specimen collection onto the new database from its predecessor. This

massive project was costly and time consuming, and subsequently became quickly outdated today. The herbarium collection is just one of many different types of collections the NYBG holds.

In general, a database can be defined as, “a collection of information about something” (Buck, Gilmore 161). Although manual collection records like card catalogues are still databases, computerized databases are most effective for museum collections. Through the use of programs like Past Perfect, TMS, and KEmu, objects can be tracked, accessioned, photographed, and maintained in an optimal way.

When it comes to digital collections, however, issues with compatibility may arise. Hardware compatibility is an issue many museums experience. For instance, at some point most users would have had to update the software in their smartphones or personal computers. Such updates are necessary to keep up with the ever-changing, always-improving technology. If such updates do not occur, devices may slow down and ultimately may not work. Museums will experience this same dilemma with their computer systems. Within a matter of years, the operating system becomes outdated and so will the database. The endless cycle of migration leads to registrars and collections managers facing the task of having to “back up” a museum’s collection information systems on external drives, USB drives, or other computers. With this comes the possibility of permanent loss if something is done incorrectly or deleted accidentally. Should any of this happen to the software museums use to maintain regular collection objects, an entirely new issue arises with having to mitigate the possible loss of digital objects over time. What happens if something goes wrong or objects accidentally get deleted? Migration, one of the main current solutions, is followed by the possibility of permanent loss or distortion of content.

A member of the registration department at the Montclair Art Museum is experiencing a database dilemma for an upcoming inventory of the museum's Native American Collection.

"Right now our computers all have 2011's version of TMS installed. In order to get 2016's versions, we have to install all the years in between in order to even start this inventory project, uploading all of the collections we have. It's expensive and time consuming because we have to have IT come in and do it," the staff member explained in a conversation on September 21, 2016. She also went on to say how they worry about loss of collection objects on the database during all of the TMS updates. Some of these databases have provisions that can cost museums their collection records if not done correctly.

Despite the disadvantages to constantly changing technology and the problems it can cause, professionals in the field can think more positively about technology because it is always attempting to improve for the better. Museum professionals and related fields continue to innovate and experiment to see what can work faster, better, and more efficiently. Continuing to think about methods of preservation, CollectionSpace is a relatively new and promising tool for museum collections. As explained through its website, "CollectionSpace is a free, open-source, web-based software application for the description, management, and dissemination of museum collections information" (CollectionSpace 1). An initiative led by the Museum of Moving Image in New York City, CollectionSpace was created by museum professionals, software engineers, and interaction designers to meet the needs of museums and institutions with collections across the world. The Andrew W. Mellon Foundation continues to fund it. It was created after a 2007 study found that nearly one-third of museums no longer used card catalogs, while nearly twenty percent had none at all. Even so, half of collecting institutions had none of their collections online or databased. The study was part of the Heritage Health Index, a study conducted by the

Institute of Museum and Library Services and Heritage Preservation (CollectionSpace 1). This was one of the reasons why the Museum of Moving Image and its partners decided to create a program such as this.

To further explain its software, CollectionSpace goes on to say:

The software is distributed via the ECLv2 license, and an active developer community ensures that CollectionSpace is continually improving. Our dynamic software is comprised of a suite of modules and services that serves as a flexible core of collections information from which interpretive materials and experiences – from printed catalogs to mobile gallery guides – may be efficiently developed. The extensible architecture allows it to be connected with other open-source applications already in use by the arts, humanities, and life sciences sectors including those for archival management, flora and fauna research, online exhibition creation, and digital asset management (CollectionSpace 1).

So far, 20 art museums, history museums, botanical gardens, universities use CollectionSpace which shows the great diversity the program can handle. CollectionSpace goes on to explain that it, “represents a paradigm shift in collections management technology, which will allow users to create a stable, authoritative, and flexible core of collections information from which interpretive materials and experiences – from printed catalogs and mobile gallery guides to research platforms – may be more effectively developed” (CollectionSpace 1). This may be perhaps the future of collections management for digital collections because of its ability to evolve with the rapid cycle of technological growth. Because it is web-based, it does not require the kinds of software updates TMS and PastPerfect need to function.

Subsequently, one author explains why and how digital collection objects have taken the museum world by storm:

The digital and media art forms...have confounded traditional museological approaches to documentation and preservation because of their ephemeral, documentary, technical and multi-part nature because of the variability and rapid obsolescence of their media formats often used in such works (Rinehart 181).

One author, Richard Rinehart, investigates the genre of digital art and all of the complications that arise with it. In his article, he proposes for museum professionals to develop a “formal notation system for media art” which essentially recreates the digital art in a more accessible format. He explains that because most digital art is made up of physical components in some way, this system should be able to “make explicit the sub-components of the work,” thus providing a compatibility with today’s archival, museum, and library technology standards (Rinehart 183). The author focuses on the software and programming aspect of the proposed preservation technology in his article.

Changing directions, another major aspect of tracking collection objects has traditionally been done by physically numbering the object with an accession number. With born-digital objects, registrars and collection managers face a different conundrum. How can a museum accession a virtual object? How is a number attached to something that is not tangible? A registrar cannot take archival paint and hand draw on an accession numbers. Nor can they use identification tags, pencils, or any of the things traditionally used when tracking and inventorying museum collections.

Typically, museum objects are assigned some sort of tracking number when they arrive in a museum. Many call this a “TR” number. Once it becomes accessioned, the object could have an entirely different number. The same can be said for loaned objects for exhibitions. In the past when museums were becoming more professionalized, the person numbering a collection could have very well started with just the number 1. Today, museums usually have a two or three-part numbering system that incorporates the year, and other identifying characteristics. The MRM5 explains this further in a chart:

2010.1	Transaction, first of year 2010
2010.1.1	First object is a single unit
2010.1.1.1-10	First object is a set of 10 pieces
2010.1.1a,b	First object is a pair, two parts

(Buck, Gilmore 206).

This simple chart breaks down all the possible ways the first object accessioned in 2010 could be identified. The third line of the chart would be a good example of how to number a set of dinner china. The last line could be an example of how to number a basket with a lid. This method could become useful when assigning a number to a digital object.

A digital object may come with a mechanism of use. For example, the Montclair Art Museum recently had an exhibition called *Come as You Are: Art of the 90's*. About 10 of the works were “virtual art” as the registrar described. One of the pieces called “Ginger Kittens” by Diana Thater contained two video files and two monitors. Hypothetically, if this piece were to be accessioned into the collection, a registrar would have had to accession the objects as one set. The video files (which came on USB drives) and the two monitors could have been numbered “2016.1.1a,b,c,d” depending on the museum’s own method of numbering. Although most museums have their own way of assigning accession numbers, this is a simple and general way of doing it in a streamlined fashion. In this case, the registrar would be able to physically paint on the number.

Unfortunately for entirely digital objects, or those who do not have a hard copy located on something like a USB or DVD, the registrar cannot follow traditional object numbering protocol. Instead, they will have to name the file the object is located on. The University of Colorado Libraries wrote “Guidelines on File Naming Conventions for Digital Collections.” Although meant for libraries, perhaps it can be applied for museum digital collections. To

“ensure consistency and uniqueness,” the person numbering an object names can either be “meaningful or non-descriptive” (University of Colorado Library 1-2). This ensures the object is not lost amongst other files and has a definitive place in a collection. It also helps it stand out and be found more easily. Meaningful file names include abbreviations, names, words. For example, a digital photograph taken of the Seton Hall library could be numbered as “shu16001.tif” meaning Seton Hall University is the location, 2016 is the year, and it was the first photograph of the year taken, while “tif” would be the format. The downside to meaningful naming is that their meanings and connotations could change overtime, thus ironically ending up meaningless (University of Colorado Library 2). Non-descriptive names, on the other hand, mean “the files express no relationship” and provide no identifying relationship. An example of this would be uploading digital photographs to a database and giving them a chronological order of numbers based on the order they were taken. This means outside of a digital database the files would be difficult to maintain since they lose their meaning outside of their format (University of Colorado Library 2).

With born-digital museum collections, making a decision on how to number a collection is a tricky and daunting task. One must take extra care to ensure their context will not be skewed, misinterpreted, or changed over time. It is so easy to accidentally change an accession number assigned to a video file, rather than accidentally changing a number that has been painted on a work of art. Because numbering objects in museums is not streamlined and the same in all institutions, registrars with these types of collections must take a methodical approach to how their collections will be accessioned and numbered, thinking of how it will be best identified in years to come.

Switching focus to another collections management issue for registrars, loans for exhibitions come into play. Especially in art museums, registrars must sometimes face the task of installing and maintaining digital objects for public display. Now, the focus is not on simply storing and preserving the object, but actually making it work. As mentioned previously, a digital object can eventually become irretrievable or its mechanism of use may no longer work. Even so, the registrars and curators of exhibitions must work together to fulfill the artist's vision, the art's intention, and make them function in their method of display.

In contemporary art museums today, trying to fulfill a digital artist's vision whose work is made on a constantly changing medium is the greatest challenge for collection managers and registrars. The same can be said for saving digital art permanently for future access and use. Contemporary artists often produce artworks that may or may not be meant to last. Things like PVC pipe, mixed media, and digital art are all art forms subject to accelerated decay. It seems like an impossible task to try and make something that is so impermanent to try and force it to last forever. Regardless of the materials used, digital or not, it is a museum's job to safeguard it for future use. Many exhibitions in contemporary art museums implement digital art forms into their blockbuster shows with film clips, sound bites, screen grabs from websites...the possibilities are endless with digital art because one can practically make anything one wants to with the right blend of software and creativity.

The Montclair Art Museum's recent exhibition on artwork of the 1990's used digital art in some of their show. The registrars and curators faced frustrating and problematic feats both during installation and the exhibition's six-month run. One registrar explained in an interview on September 28th, 2016 that "virtual" objects are often the most troublesome during exhibitions because they have to make the artwork run in the format the artist wants. It subsequently has to

stay working correctly during the entire exhibition. This exhibition in particular, *Come as You Are: Art of the 90's*, was a travelling exhibition, so the registrars at the MAM had to take extra special care to ensure the art and their methods of display were working for the museums plan of showing it in the future.

Of the ten or so “virtual” works of art, as the registrar referred to them, about half were extremely problematic. Prema Murthy’s piece *Bindi Girl* was a website shown on a mini-mac. Essentially, the website had adult content. With all of the school groups that visit the museum daily, the registrars would have to have set times in which they had to shut off the piece because it was too inappropriate for certain age groups to see. Turning off an old monitor like the mini-mac they were using made it constantly freeze, leading it to need to be reset on an almost daily basis (Montclair Art Museum 2016).

Perhaps the most taxing artworks in the 90’s exhibition was Joan Heemskerk and Dean Paesman’s *Untitled Game (A-X, Q-L, Area, Ctrl-Space)*. The piece was a videogame and the “infrastructure it was created on no longer existed” (Montclair Art Museum 2016). Instead of using the monitors the artists originally wanted, the registrars had to use mini-macs, which is a very different format. This became a battle between the registrars and the artists. The artists felt their vision was not being fulfilled, yet the piece would quite literally not function using the technology they created it for decades ago. Along with this setback, the mini-macs the MAM used in the end also posed some difficulties due to conversion issues with the videogame (Montclair Art Museum 2016).

Consequently, a few of the other pieces in this particular exhibition would not cooperate with their original formats and needed to be converted. About three to four pieces were websites

that were so outdated, they needed to be made into screengrabs and mounted on mat board or shown on a monitor as a live image. For example, Mark Napier's *Riot* was a series of four websites, but looked lackluster so the gallery they came from sent screengrabs to be mounted on black mat board. Although they were not the original works, not the original intention, and not the interactive program the artist wanted, the pieces had to become representational in order to be displayed (Montclair Art Museum 2016). On the other hand, Keith and Mendi Obadike's artwork was an old eBay ad from several years ago. The website link was saved onto a USB drive and was meant to be displayed on a vertical monitor (a format which is a rare find). It was shown as a live image despite all of the difficulties that came with displaying a decade-old website (Montclair Art Museum 2016). Situations like this make museum professionals question whether or not it matched the artist's intention was in the first place. How many times can a born-digital work of art be transferred into another format before it becomes something entirely different?

To tie this all together, the rising popularity of digital objects in collections and exhibitions present several obstacles for museum professionals. Because the technology industry is one of the fastest growing markets in the world, nearly every program and device in existence is constantly being changed and updated, thus making technological obsolescence seemingly inevitable. A registrar's job is to protect and keep cultural heritage in perpetuity. It seems impossible to do this when eventually digital collection objects and their methods of use will stop working, possibly be deleted, or become irretrievable. With more methodical planning when using databases to maintain a collection and finding better systems to number and track these objects, the scope of how museums save born-digital media will ideally evolve with technology itself. During exhibitions, museum staff must take extra care to ensure the objects will not be damaged, deleted, or otherwise not shown in an unintended context—the handling phase is when

digital art, like all other collection objects, are at their most vulnerable. The notion of object decay for this genre is just as legitimate as it is for a 17th-century painting. Now is the time to find the best procedures and practices for safeguarding these collection objects.

Chapter 3

Legal Issues Surrounding Born-Digital Collections

Google is one of the most revolutionary technological advances of all time. There is an underappreciated ability to type a word, phrase, name, destination—anything—into this search engine and get millions of hits in under a second. A person can virtually travel from Rome to the Himalayas to Seton Hall all in the same day. One can view almost any art form that peaks curiosity in high definition. Programs like Google Arts & Culture allow us to see master works like Van Gogh's *Starry Night* noticing each brush stroke, every gap between the paint and canvas. The internet has given us the ability to find out anything, see anything, and with minimal boundaries of doing so, regardless if the content is entirely understood. The concept of public patrimony presents itself when thinking about the internet and all it has to offer society. With every bit of information at one's fingertips, society has a newfound sense of entitlement. Everything belongs to everyone because any thought, idea, or thing is available instantaneously online. What most people do not think about are the inherent legal issues like copyright, fair use, ownership, and access. Museums face this challenge in a multitude of ways, whether born-digital collection objects are brought to mind or simply the idea of digitizing an entire collection. Museums face limitations to things that individuals uploading and downloading from the internet do not. This chapter explores key legal issues like copyright and accessibility for digital objects in museums. The word "safeguard" takes on an entirely new definition, especially since it deals with individual and public rights when confronted with these legal issues. Safeguarding digital objects can also protect an individual's rights over copyright and the public's right to access.

When thinking of ownership over objects in museums, there are a series of steps to ensure title is transferred, free and clear. A deed of gift is signed, an object gets accessioned, but despite these things that ensure a museum owns an object, a museum may not have copyright over it. Ownership and copyright are two very separate things. Throwing in the notion of a born-digital object, these lines get blurred. How can someone possibly own something that is not physically tangible? Is a virtual object only intellectual property or can someone actually own it? When objects are “virtually tangible,” meaning they can only be viewed digitally on a screen, some tend to lose a sense of realness when thinking about them. Digital media is still as much of an object as an 18th-century book on display in a museum. Ownership and copyright seem to intertwine for digital collection objects, versus physical collection objects. When they are made public online anyone with access to them can download, reformat, and change them. Museums professionals have practically no control over their digital collections like videos and photographs once they are in the public domain.

By definition, “copyright is the legal recognition of special property rights that a creator may have in his or her work.” Most importantly, protection of these rights is given to the original creators that are in a fixed, tangible medium (Malaro, DeAngelis 166). The parameters of the words “fixed” and “tangible medium” are foggy and ill-defined. It does not include how digital objects and creations are covered, if at all, under this umbrella.

According to *A Legal Primer on Managing Museum Collections*, copyright law provides the most pervasive restrictions on the uses of museum collection objects. The authors dive into the murky realm of technology and copyright by saying, “the growing copyright concerns for museums are driven in large by the digital information revolution” (Malaro, DeAngelis 164-165). In essence, existing laws for copyright in general cannot keep up with the rapid changes in

technology. One author explains that these “revolutionary technologies...enable reproduction of artworks in digital form and instantaneous transmission of digitized works through the internet and throughout the world” (Appel 1). The ability to copy images and documents into unknown formats and transmit them worldwide causes confusion and insecurity for museums. Copyright also covers intellectual property, or original thoughts and ideas. All museums deal with copyright, not just art museums with original work on display.

Copyright law follows five uses of a copyrighted work. These include:

1. The right of reproduction
2. The right of adaptation
3. The right of redistribution
4. The right of public performance
5. The right of display

Museums must always abide by these rights. One should note that “copyright law specifically provides that owner of an object...may display the original work publicly without further authority from the copyright holder” (Malaro, DeAngelis 167). Despite these guidelines, digital art forms are susceptible to lack of control once people can get a hold of them online. Although copyright is law, it seems it is often difficult to regulate since so much of what happens online is done in the dark by unknown parties. Abridging conflicts with copyright, like control over reproduction and redistribution, Malaro and DeAngelis go on to say, “Digital-born new media works are challenging traditional practices in collections management and care. In sum, the digital age has touched every aspect of museum operations” (189).

Unfortunately, the original copyright act of 1976 did not cover computer programs or the internet. Much of today's legislation predated the technology boom and has not yet caught up to the ever-changing industry. More recent legislation has made attempts to regulate digital copyrightable materials through the Digital Millennium Copyright Act. Signed into law by President Clinton in 1998, the DMCA addresses copyright conflicts by making works accessible to the public. It also implements two 1996 World Intellectual Property Organization (WIPO) treaties: the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty (www.copyright.gov). Essentially, it "extends existing legal precepts to the digital environment and confers new rights on copyright material" (Appel 1).

The DCMA has penalties for the following:

1. Circulating technological measures that control access to and reproduction of copyrighted works transmitted digitally
2. Providing, distributing, or importing for distribution copyrighted material is false
3. Removing or altering copyrighted information

(Appel, copyright.gov). Regardless of these parameters and the Digital Millennium Copyright Act, none of it seems as enforceable. The DMCA was still only enacted in 1998, well before the technological boom experienced since the 2000's. Appel continues, "Copyright's theory of authorship and originality is even more strained in the digital environment than in the print environment, given the possibilities for manipulation, alteration, and collaborative authorship of digital works" (1). An example of this would be thinking of current genres of music like electronic house and dance. Many of these artists and DJs incorporate other artists' vocals and

music, mixing it together with something entirely different and new, often without permission from the original artist. The new artist can then sell and perform the music wherever he or she desires due to the ability to upload and download from anywhere on a myriad of different platforms. Unless caught by the original creator of the music, copyright will probably never be enforced. For museums, similar problems can arise. Copying a high-resolution image of a photograph from a museum's website, changing it visually by adding to it or photoshopping it, and then publishing it online without the museum's knowledge is an example of this.

As for museums, copyright still remains unclear about topics like rights of reproduction. The court now recognizes that something as basic as uploading something in a digital format to a museum database or to its website is a form of reproduction in a most basic sense. This is an act over which the copyright owner reserves the right. Therefore, reproducing a work in a digital format is naturally a copyright infringement. Posting an image of a work online is also an infringement of the right of public display and the right of redistribution, since someone could copy it, save it, and redistribute it wherever they please (Malaro, DeAngelis 191).

When thinking of copyright for use of born-digital collections, the topic of fair use comes hand-in-hand. Fair use of copyrighted materials follows a set of four specific factors:

1. The purpose and character of the use, including whether such use is “transformative” in nature (creating something new that is not a substitute for the original); whether the new work is commercial in nature or created for non-profit educational purposes;
2. The nature of the copyrighted work (the more creative the work, the more protection it receives; the more factual the work, the less protection it receives);

3. The amount and substantiality of the portion used in relation to the copyrighted work as a whole (both the quantity and quality of what has been taken will be considered);
4. The effect of the use upon the potential market for or value of the copyrighted work

(Malaro, DeAngelis 195). The authors of the *Legal Primer* describe these limitations as the “most significant yet the most poorly defined,” leaving museum professionals confused and those interpreting it with the ability to extort usage of it. Going back to the example of a DJ using another artist’s music mixed in with his or her own, one can refer to #1 as the song being “transformative.” Who decides when it is transformative enough to not constitute an instance of infringement? Looking at the phrase about uses for education in a non-profit institution, the majority of museums fall under this category, yet museums face issues with copyright and fair use constantly. Legislation in the born-digital object world remains murky and confusing for all who encounter it.

A landmark case about copyright was *Bridgeman Art Library v. Corel Corp.*, 36 F. Supp. 2d 191 (S.D.N.Y. 1999). This particular case was between the Bridgeman Art Library and Corel Corp., a company that specialized in CD-ROMS that contained digitized images of European master’s paintings. They acquired the images from a defunct company called “Off the Wall Images.” Bridgeman sued Corel Corp. for using images of their collection without permission, to which they owned the copyright and declared copyright infringement. The library processed the works as digital photographs and transparencies, of which, in turn, they licensed copies for a fee. *Bridgeman Art Library v. Corel Corp.*, 36 F. Supp. 2d 191 (S.D.N.Y. 1999). Both of the judgments issued for the plaintiff’s case to be dismissed, as the works (the digital image versions) were not considered original enough to claim copyright infringement (www.law.cornell.edu). This case shows the dynamics of copyright that museums and other

collecting institutions face when trying to protect their work from use without their permission or knowledge.

One author ties in nearly every issue collecting institutions encounter when thinking of copyright, access to materials, and notes several potential solutions. Although the article focuses on archival repositories controlling online holdings, the same circumstances can be applied to museums with born-digital collections. Because digital content cannot be controlled once it is in the public domain, museums have no way of preventing it from being misused and cannot know who is doing what with it. Copyright and all the bylaws that accompany it, poses an inherent conflict of interest for museums with digital collections because it impinges on the public's right to access (Dryden 522-523). Museums are mostly non-profit and are technically owned by the public. A museum's true mission is to serve the public. The balance of public access and duties to care for and preserve objects has been a historic battle since the conception of museums. This only worsened and became more unclear since museums began collecting and preserving born-digital objects and art. Dryden explains how archives had to change their practices with the times, just as museums with these kinds of objects will have to as well.

In his article, Dryden poses several solutions for access to copyrighted materials. The first is to reduce the quality of the copy uploaded to the public online. This may be frustrating to those who are used to today's high-resolution photography and video. No visitor of a website would want to view a grainy photograph, which most likely defeats the original intention of the photographer in the first place. Another solution would to somehow prevent the copying of the object through the use of software programs or a skilled computer technician when creating or uploading an object in digital form. This may be expensive, but an agreeable option for museums with large born-digital collections like the Museum of Moving Image. Museums should have

some sort of reminder about copyright on their websites or perhaps a terms of use statement with which users must consent by clicking “I agree” after reading through the regulations. One last solution Dryden proposes is a fee for usage. If museums charge an admission fee to visit the museum, they should have the ability to do so for digital objects online as well. (Dryden 531-536).

Access in the age of Google can be a tricky thing. We live in a mass-click culture in which one can upload, download, and manipulate all things digital whenever and however one pleases. Contemporary society feels a strong sense of entitlement over what is on the web and many things in a digital format. This puts museums in a tough place, as they must juggle the role of serving the public while still protecting the collections from the public. Because museum audiences demand access and speed when it comes to technology, they may find the lack of momentum frustrating when it comes to digital objects being accessible online or digital objects made viewable and usable elsewhere. This stems from many reasons such as copyright issues, lack of trained staff, scarce resources, ethical concerns, fear of piracy, and so on. Overall, access is delayed to born-digital objects in museums (Gracy 424). Museums are historically understaffed and underfunded in relation to the amount of work collections management requires. Museums often take the “we’ll get around to it eventually” approach when considering digitizing collections for public access. One author explains that most institutions with digital collections “have not yet upgraded beyond experimental projects full scale, economically sustainable digital programs...to the demands of access and preservation” (Gracy 423). This statement ties into the previous chapter in regards to software not being up to date with the ever-changing technological standards to provide agreeable access to collection objects.

With access to universal resources like YouTube, a mecca for digital videos, there is an unhindered ability to share, copy, distribute information instantly with millions of people. In contrast, museum audiences have a difficult time grasping why museums may limit access to digital objects when they can simply search for a specific dance performance on YouTube and watch it instantaneously for free. Museum collections belong to the public and are for the public, but with the internet comes negligence for the artist and creator of the object. With limitations like copyright in place, along with the other implications that the internet carries, museums are likely to remain in a constant battle over accessibility. It is a loaded word in the museum profession. Access means many things from physical access inside a museum, intellectual access about the content of exhibitions, to access to collections, which technically belong to the public in the first place. When thinking about digital media, museums must balance the public's right to access as well as protect them when put on a web-based platform. Museums must safeguard both the public's right and the object itself from being copied, transmitted, or altered.

Continuing to think about access, one author writes about an interesting take on the repatriation of digital archives. He specifically discusses cultural access by native peoples to their own cultural patrimony that is born-digital archives and objects. One example used tells the story of a modern digital photograph that was taken of a male initiation ceremony of the Maramungu people. Cultural restrictions would prevent access to essentially everyone, only to be viewed by older men (Christen 186). One may think of the Native American Graves Protection and Repatriation Act and how modern digital videos and photographs may be subject to cultural limitations, different terms of access, and possibly subject to repatriation. The author take an interesting look at access, but expresses similar concerns and frustrations to other authors mentioned in this chapter. Christen goes on to say, "the permutations of types of access are

unlimited, dynamic, and in constant negotiation, just as they are offline” (186). Access is a complex term which museums have a difficult time defining its parameters. The public should have the right to access something like the video of the Maramungu initiation ceremony, however cultural limitations advise otherwise. Museums have the problematic task of processing ethical conflicts in relation to legal rights of the public. They must exercise discretion in relation to how far access can stretch.

Consequently, Christen finds a common misconception with born-digital objects. This genre of museum collections is not meant to be a surrogate of material forms of cultural heritage—they are objects in and of themselves, no different from a painting or sculpture (Christen 187). They are simply an alternate route with a dynamic life, just like many physical objects. Access has been a feat in general for most collecting institutions. Digital objects are a whole other beast, with the lack of ability to control, hardly any parameters or provisions. The author ties his ideas about digital repatriation to some of the thoughts of like-minded professionals in the field:

Specificity of digital resources—the ease with which they can be copied, redistributed, revised, their ability to exist in multiple locations at once; and their ephemeral nature makes them distinct cultural objects, provide scholars with a rich platform for engaging with varied processes of cultural reproduction and multiple resources for circulation of knowledge (187).

The author views digital collections as the future (if not present) of museums, as well as the best method of circulating educational resources around the world.

In essence, museum collections are public patrimony—they belong to everyone and are for everyone. By finding more innovative ways to provide access, along with legislation willing to evolve with the rapid pace of technological change, museums can become better equipped to

handle the legal and ethical issues surrounding born-digital objects. For now, it may seem as if there is no ideal approach to the plethora of questions about copyright or solutions for providing access to the public without impinging on a copyright holder's rights. The digital age does, however, force museums to update and change old methods of collection management. It keeps museums vigilant by making them develop their "best practices" to evolve with technology.

Chapter 4

The Future of Museums and Collection Management

In earliest times of human history, technology may have denoted something as simple as a lithic tool used in everyday life. Today, technology may refer to iPads, the navigation in cars, or anything that can be done easily with the push of a button or even voice commands. Technology today is fast-paced and ever-evolving. One piece of technology may become better than the next, typically in a matter of months. The iPhone 6s is now “outdated” to its successor, the 7, both of which have release dates just six months apart. People have the ability to connect, or reconnect, with people across the globe instantly through programs like Skype and Facetime. Everything is completed with instant gratification. This state of constant update and change has caused many problems for museums since the conception of the computer. Museums have been seen as “stuck in the past” based on their reputation of being homes for history. Most struggle with being understaffed and underfunded, leaving collections to be pushed aside and not documented or preserved properly. With the surge of born-digital collections into museums, registrars and collection managers have the responsibility of trying to keep up. Despite these struggles, born-digital media hold advantages, too.

In a lecture at Seton Hall University on April 11, 2016, Thelma Golden, Director of The Studio Museum in Harlem, spoke of the future of museums. She explained that digital media has increased the audience of museums. Today’s society lives in a “mass-click” culture with more exposure and more incentive to visit (Golden, April 11, 2016). The Studio Museum is currently planning to build a new, larger venue in Harlem. When asked about technology in the new

museum, Golden says they cannot begin to think about technology in the museum until it reopens in the new building in 2021 because they cannot assume where technology will be by then. Still, Golden inferred that digital is the future of museums from collections to exhibitions. Social media is the best current marketing tool for museums and most businesses, too. As museums start to utilize this more, one can predict a rebirth of sorts, with higher attendance and more interest. This speaks to collections as well.

Just as the television generation may have given museums a second consideration, similarly, social media may have the potential to do the same for museums. Collections will have to be more easily accessible and ready for exhibition. Born-digital objects will have to be preserved expertly, as this is what people will be coming to museums to see in one hundred years. One can visit the Museum of Early Trades and Crafts in Madison, New Jersey to see “old technology” of farming tools, sewing mechanisms, and a myriad of other everyday objects that were once state-of-the-art. What was once modern technology to early American settlers is now considered history. The same will be said of MacBooks and phone applications like Candy Crush. People will want to see and experience the technology used in everyday life in the future. Perhaps computer archaeologists will exist, digging up old Facebook profiles to see how people of this generation once lived. All of these things somehow have to remain or become accessible decades from now, which is why digital technology exists to help museum professionals, not to hinder productivity and collections. Preserving born-digital objects is not necessarily impossible—the technology just has not been created yet.

In today’s society, everything is considered public patrimony. Society is no longer just a cultural thing, thanks to the Internet. An image of Vermeer’s 1665 painting *Girl with the Pearl Earring* does not just belong to the Dutch or those who visit the Mauritshuis in the Netherlands;

it belongs to anyone who can search it online and view it instantly. One author writes about the positives and negatives of digital media in his article *Scarcity or Abundance? Preserving the Past in a Digital Era*. He explains that the good thing about the internet is that despite rotting of links and websites, nothing can absolutely go away permanently. Deleting something is not the same thing as “rot” like previous authors have talked about, insisting the crisis over digital preservation is overwhelming yet exaggerated (Rosenzweig 737-740). “Probably the greatest distortion has been the implicit suggestion that we have somehow fallen from a golden age of preservation in which everything of importance has already been saved” (740). Digital, public patrimony is very much important from the photographs and videos uploaded online, to digital art and performance. Digital records may fail completely and quickly become unreadable. This is due to the fact that current technology has a fragile, short life span and constant changes in hardware (Rosenzweig 741). If the desire for new, constant innovation slowed down to use what is already here, what is already great, this digital preservation challenge would be much less of a challenge. “Microsoft only supports its software for about 5 years,” the author explains (Rosenzweig 742). This licensed and centrally controlled digital content erodes the ability to preserve anything. He says, unlike many other authors discussed in these last few chapters, the solution cannot be migration from one system to another.

The solution Rosenzweig proposes is referred to as “emulation.” This system, although stating it is only partly theoretical, intends to work with later generations of hardware and software. It does so by mimicking the original formats used. A single “emulation” can preserve a vast number of digital content. The authors calls it the “magic-bullet” all-or-nothing solution but fails to explain the logistics or how it works. Another solution he discusses is the “Pitt Project,” which was a three year project spanning 1993 to 1996. The project entailed capturing

Internet images, moving them link by link and completing a detailed snapshot every few months. It then analyzes web use for the Internet Archive (IA). By 2002, the IA collected 100 terabytes of web data, or about 10 billion web pages for comparison—an immense amount of information (749-750). The Internet Archive is considered the Google for computer scientists and a great resource for digital media archives and collections. Still, much of their website gives error messages like “Not in Archive” or “File Location Error” meaning the object is no longer accessible or gone altogether (751). Another author called Internet projects of the 1990’s ignorant of the fluidity of the web, stating they were more concerned with access and audience, setting aside issues of impermanence for later (Thomas 457).

An article in the *Journal of American History* includes an interview of a handful of history scholars about digital history. One notes:

Every year it becomes easier to do digital history...some of the concerns will disappear. Even once-complicated pieces of digital history are becoming simpler. Five years ago you had to know programming language to create a unique, history-oriented search engine on the Web. Now services like Google Custom Search, Yahoo Pipes, and Rollyo make it simpler to, say, create a site that scans all resources about the French Revolution, without knowing anything about databases, spiders, or Web applications. This trend will undoubtedly continue, lowering barriers to those who do not have technical skills (Cohen 462).

Of course, one can translate this from history and archives to the museum world. This statement is promising for the future of museums. Institutions with less staff and funding will be more capable of learning how to save born-digital collections without hiring a third party source or a high number of grants. Though it may take time, maybe even decades, it is comforting to know technology is intended to help museums rather than make things harder. There are downsides to digital media and the mediums to preserve them, but with time and research, museums will have solutions eventually.

The Online Computer Library Center (OCLC) is a global library that provides technology services, research, and community programs. An essay by Ricky Erway of OCLC Research defines “the way forward” for libraries and other collecting institutions:

The first step is to establish basic policies and approaches for each type of born-digital material in your care. Then take inventory and assess format and media stability. Find others who are working on similar challenges. There may be already existing standards, tools, or procedures used by another community, such as law enforcement or gamers. Turnkey systems are unlikely, but there are many micro-services to handle various tasks (Erway 4).

The easiest way for museums to control their digital collections is to begin their preventative care and conservation from the start. It may also require starting with the creator or artist of the digital art, much like the artist of *Spook...* (1999) suggests from the first chapter. Museums with any digital collections should inventory what they already have periodically and assess their needs, just like any other kind of collection. Born-digital media requires more attention because of their rapid rate of deterioration and obsolescence. Museums should take advantage of these “micro-services” and other resources already in place. Erway lists the most promising aspects of progress in his essay. First, there is already a heightened awareness of this pressing issue of preservation. Next, there are already institutions facing this problem on a larger scale, as digital media collections like Ars Electronica and the Museum of Moving Image have shown. As a result, there are instances in which born-digital media are being preserved well (Erway 4). Regardless of these points, Erway emphasizes that the public still has little access to these collections. “Through effective communication and collaboration and by taking the first basic steps, progress will be made towards that goal” (Erway 4). As of 2014, “Resurrection Lab is a new project initiated by iMAL to answer to the current issues surrounding the preservation of digital art and its public access” (iMAL 1). It started because “without substantial R&D effort in preservation methodologies and technologies, without political decisions regarding software

publishers, main internet actors and IPR issues, without a profound analysis of the roles and actions of museums” this born-digital media will be lost forever (iMAL 1). Its mission is to provide both public access to born-digital materials in museums and preserve them. Their project first began with materials and web-based objects from the 1990’s, works that were saved on CD-ROMS and floppy disks.

Another project from iMAL is the bwFLA project being completed by the University of Freiburg. It is based upon the concept of emulation that author Rosenzweig discusses. The project website describes “emulation as a service” and functional long-term archiving (University of Freiburg 1) Emulation, like Rosenzweig was saying, aims to preserve and mimic the digital object’s original state. By providing its native environment, the object’s “characteristics, look and feel, and utility will be preserved. This service is said to be able to reproduce information, access historic documents and software in the native form, conserve digital culture in an easy and accessible way, as well as crowd curation “share and care” (University of Freiburg 1). bwFLA claims to be one of the first emulation services and that it is the path to the future of born-digital media for both museums and beyond. The problem with this program is that it is still in development—museums need something now.

Despite the long wait, bwFLA has already successfully “resurrected” digital art. *An Anecdoted Archive from the Cold War* (1994) by George Legrady is a CD-ROM with a historical inscription of the Cold War through a collection of documents and a floorplan. Another work that has been saved is *No Other Symptoms - Time Travelling with Rosalind Brodsky* (1999) by Suzanne Treister. This seems like a CD-ROM computer game that investigates a time-travelling woman with an alter ego (iMal). Both are as viewable, accessible, and functioning as they were

on the day they were conceived. Unlike Rosenzweig's earlier statements about this program being theoretical, it seems as though emulation is already being tested and working fruitfully.

Preservation and conservation are an intrinsic part of what a museum registrar does. Finding the best, most refined methods of saving cultural heritage, whether an object is physically tangible or virtual on a computer screen, requires time and money. Through the tedious research of programs like iMal, museums are one step closer to finding a better solution than migration to external hard drives and frequent, time-consuming software updates. Based on current progress and research, emulation seems to be the next step for collections management. Although still in the experimental phase, iMal's current successes in the endeavor show true promise and dedication to finding a best practice for safeguarding born-digital media.

This society, like Thelma Golden said, is a "mass-click" one. It is a fast-paced, constantly moving and changing world with the most amazing technology turning the corner every week it seems. Despite all of the challenges that technological change present to museums, it also generates an air of positivity for all of the possibilities not yet created. If technology is constantly accelerating and improving, who is to say the same is not possible for museums? Current solutions use migration techniques to preserve and convert born-digital media. It seems as though emigration might be down the road when these different methodologies are further researched and analyzed. For now, museums with born-digital collections must do their best to abide by preventative care with these fragile objects in the moment when they are acquired. While there may not be an ideal solution now, authors and researchers are confident that technology will eventually exist to preserve and conserve today's cultural heritage. Born-digital objects and art tell just as important of a story as any other museum object. The programs to aid

museums in maintaining it will be created just like any other technology. Meanwhile, museums must do everything they can to safeguard born-digital collections for future use and access.

Conclusion

From the conception of the computer to smart phones society so desperately depends on today, technology has shaped the way one thinks and functions. The digital revolution has been rapid and constantly changing, so fast that institutions like museums have a difficult time in keeping up. Just when one gets used to one piece of technology, the next best thing comes out. If technology goes without being upgraded, most devices become obsolete and the information saved becomes irretrievable. The challenge museums face has been accelerated because of their collections, specifically those with born-digital objects.

This thesis explored and dissected the ins and outs of born-digital media in relation to museum collection management. It discussed various born-digital objects such as video art, navigated legal issues such as copyright infringement, and analyzed current and evolving solutions such as emulation. I argue that the current fears of losing contemporary cultural heritage will be lessened when considering the opportunities of various existing and future technologies to address such concerns. Technology becomes obsolete when hardware and software become outdated. Born-digital media are some of the most fragile types of art and objects that museums collect. Although digital media present significant preservation challenges, museum technologies are only just beginning to offer remedies and solutions. As with other technology, the best applications may not have been created yet to help museum professionals preserve and conserve born-digital objects. There may always be something greater waiting to be invented. With diligence and patience, museums will be preserving and safeguarding their collections for the future.

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